

Title (en)

Method for producing ceramic devices by sintering in a low pO₂ atmosphere and using sintering additives comprising a transition metal

Title (de)

Verfahren zur Herstellung von Keramikvorrichtungen durch Sinterung mit einem Übergangsmetall behaltende Sinteradditiven in einer Atmosphäre mit niedrigem Sauerstoffpartialdruck

Title (fr)

Procédé de fabrication de dispositifs céramiques par frittage dans une atmosphère à faible pression partielle d' O₂ et à l'aide d'additifs de frittage comprenant un métal de transition

Publication

EP 2503631 A1 20120926 (EN)

Application

EP 11002478 A 20110324

Priority

EP 11002478 A 20110324

Abstract (en)

The present invention provides a method for producing a ceramic device in a low pO₂ atmosphere, comprising the steps of: - providing a composition comprising a base material and a transition metal; - forming a first layer of said composition; - optionally forming at least one layer on one side or both sides of said first layer; and - sintering the multilayer structure in a low pO₂ atmosphere; characterized in that - the amount of the transition metal is from 0.01 to 4 mol%, based on the composition of the first layer; - the oxygen partial pressure pO₂ is 10⁻¹⁴ Pa or less; and - the sintering temperature is in the range of from 700 to 1600 °C.

IPC 8 full level

H01M 8/12 (2006.01); **B01D 53/22** (2006.01); **B01D 67/00** (2006.01); **B01D 69/12** (2006.01); **B01D 71/02** (2006.01); **C01B 13/02** (2006.01); **C04B 35/44** (2006.01); **C04B 35/462** (2006.01); **C04B 35/486** (2006.01); **C04B 35/50** (2006.01); **C04B 35/64** (2006.01); **C23C 28/00** (2006.01); **H01M 4/88** (2006.01)

CPC (source: EP KR US)

B01D 53/228 (2013.01 - EP US); **B01D 67/00414** (2022.08 - EP KR US); **B01D 69/1213** (2022.08 - EP KR US); **B01D 69/1216** (2022.08 - EP KR US); **B01D 71/0271** (2022.08 - EP KR US); **C01B 13/0255** (2013.01 - EP US); **C04B 35/44** (2013.01 - EP KR US); **C04B 35/462** (2013.01 - EP KR US); **C04B 35/486** (2013.01 - EP KR US); **C04B 35/50** (2013.01 - EP KR US); **C04B 35/64** (2013.01 - EP US); **H01M 4/88** (2013.01 - KR); **H01M 8/12** (2013.01 - KR); **H01M 8/1253** (2013.01 - EP US); **H01M 8/126** (2013.01 - EP US); **B01D 2323/10** (2013.01 - EP US); **C04B 2235/3208** (2013.01 - EP US); **C04B 2235/3224** (2013.01 - EP US); **C04B 2235/3225** (2013.01 - EP US); **C04B 2235/3229** (2013.01 - EP US); **C04B 2235/3251** (2013.01 - EP US); **C04B 2235/3274** (2013.01 - EP US); **C04B 2235/3286** (2013.01 - EP US); **C04B 2235/40** (2013.01 - EP US); **C04B 2235/404** (2013.01 - EP US); **C04B 2235/405** (2013.01 - EP US); **C04B 2235/616** (2013.01 - EP US); **C04B 2235/652** (2013.01 - EP US); **C04B 2235/656** (2013.01 - EP US); **C04B 2235/6562** (2013.01 - EP US); **C04B 2235/658** (2013.01 - EP US); **C04B 2235/6582** (2013.01 - EP US); **C04B 2235/6584** (2013.01 - EP US); **C04B 2235/75** (2013.01 - EP US); **C04B 2235/77** (2013.01 - EP US); **C04B 2235/775** (2013.01 - EP US); **H01M 4/8846** (2013.01 - EP US); **H01M 4/8857** (2013.01 - EP US); **H01M 4/8889** (2013.01 - EP US); **H01M 2008/1293** (2013.01 - EP US); **Y02E 60/50** (2013.01 - EP US); **Y02P 70/50** (2015.11 - EP US)

Citation (applicant)

- US 6902790 B1 20050607 - HATA KAZUO [JP], et al
- US 5807642 A 19980915 - XUE LIANG AN [US], et al
- WO 2006074932 A1 20060720 - RISOE NAT LAB [DK], et al
- JOACHIM MAIER: "Ionic and mixed conductors for electrochemical devices", RADIATION EFFECTS & DEFECTS IN SOLIDS, vol. 158, 2003, pages 1 - 10

Citation (search report)

- [XDA] WO 2006074932 A1 20060720 - RISOE NAT LAB [DK], et al
- [Y] EP 2030674 A1 20090304 - UNIV DENMARK TECH DTU [DK]
- [Y] WO 2007086949 A2 20070802 - UNIV BOSTON [US], et al
- [Y] FR 2948821 A1 20110204 - COMMISSARIAT ENERGIE ATOMIQUE [FR]
- [YD] EP 1063212 A1 20001227 - NIPPON CATALYTIC CHEM IND [JP]
- [Y] HE Z ET AL: "Densification and grain growth during early-stage sintering of Ce_{0.9}Gd_{0.1}O_{1.95}-delta in a reducing atmosphere", ACTA MATERIALIA, ELSEVIER, OXFORD, GB, vol. 58, no. 11, 1 June 2010 (2010-06-01), pages 3860 - 3866, XP027045188, ISSN: 1359-6454, [retrieved on 20100426]
- [Y] NICHOLAS ET AL: "Prediction and evaluation of sintering aids for Cerium Gadolinium Oxide", SOLID STATE IONICS, NORTH HOLLAND PUB. COMPANY, AMSTERDAM; NL, NL, vol. 178, no. 19-20, 7 August 2007 (2007-08-07), pages 1187 - 1194, XP022188805, ISSN: 0167-2738, DOI: 10.1016/J.SSI.2007.05.019
- [Y] TIANSHU Z ET AL: "Sintering and densification behavior of Mn-doped CeO₂", MATERIALS SCIENCE AND ENGINEERING B, ELSEVIER SEQUOIA, LAUSANNE, CH, vol. 83, no. 1-3, 21 June 2001 (2001-06-21), pages 235 - 241, XP004242270, ISSN: 0921-5107, DOI: 10.1016/S0921-5107(01)00534-7

Cited by

US9704650B2; WO2015065591A1; WO2020135972A1

Designated contracting state (EPC)

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)

BA ME

DOCDB simple family (publication)

EP 2503631 A1 20120926; AU 2012231032 A1 20131010; CA 2830062 A1 20120927; CN 103460479 A 20131218; EA 201391347 A1 20140228; EP 2759015 A1 20140730; JP 2014510014 A 20140424; KR 20140016947 A 20140210; US 2014010953 A1 20140109; WO 2012126579 A1 20120927

DOCDB simple family (application)

EP 11002478 A 20110324; AU 2012231032 A 20120309; CA 2830062 A 20120309; CN 201280014872 A 20120309; EA 201391347 A 20120309;
EP 12711111 A 20120309; EP 2012001065 W 20120309; JP 2014500273 A 20120309; KR 20137027625 A 20120309;
US 201214005233 A 20120309